Negative self-evaluation and the genesis of internal threat: beyond a continuum of suicidal thought and behaviour

Negative self-evaluation and the genesis of internal threat: Beyond a continuum of suicidal thought and behaviour

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Abstract

Background: Death by suicide is often preceded by attempted suicide, suicidal ideation and non-suicidal self-injury (NSSI). These extreme thoughts and behaviours have been considered in terms of a continuum of suicidality. Little known research however has considered a suicide continuum that extends beyond these extreme thoughts and behaviours and incorporates a much wider array of phenomena that may vary in severity, and may constitute a broader negative self-evaluation (NSE) continuum.

Method: Harvesting key indicators of NSE from a British epidemiological survey (N=8,580), the current study used exploratory factor analysis, confirmatory factor analysis and factor mixture modelling to (i) identify the dimensional structure of NSE in the general population and (ii) profile the distribution of the resultant NSE dimensions. Multinomial logistic regression was then used to differentiate between classes using an array of risk variables, psychopathology outcome variables and a suicide attempt indicator.

Results: A 4-factor model that reflected graded levels of NSE was identified; (F1) low self-worth and subordination (F2) depression, (F3) suicidal thoughts, (F4) self-harm. Seven classes suggested a clear pattern of NSE severity. Classes characterised by higher levels across the dimensions exhibited greater risk and poorer outcomes. Greatest risk for suicide attempt was associated with a class characterised by engagement in self-harm behaviour.

Conclusions: Low self-worth, subordination and depression, while representative of distinct groups in the population, are also highly prevalent in those who entertain suicidal thoughts and engage in self-harm behaviour. The findings promote further investigation into the genesis and evolution of suicidality and internal threat.

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Introduction

Non-suicidal self-injury (NSSI) and suicidal ideation (SI) have each been shown to confer risk for suicidal attempts (SA; Ribeiro *et al.* 2016). NSSI, SI and SA are each also characterised by many of the same underlying risk factors e.g. depression, anxiety and substance abuse (Andover *et al.* 2012; Mars *et al.* 2014; Grandclerc *et al.* 2016; May & Klonsky, 2016). Moreover, these experiences seem to be temporally associated. De Leo *et al.* (2005) for example, showed that over 99% of suicide attempters planned their attempt or experienced SI before their attempt and that over 50% of individuals who reported suicidal ideation or behaviour experienced all levels of 'less severe' suicidal thoughts and behaviours preceding their most severe experience (e.g. life not worth living, seriously considering suicide). NSSI has also been found to prospectively predict elevated SI (Guan *et al.* 2012). Kessler *et al.* (1999), analysing data from the National Comorbidity Survey, showed that transition rates from ideator to planner, planner to attempter and ideator to unplanned attempter were 34%, 72% and 26% respectively. Similar transition rates have also been observed more recently in a large metropolitan Chinese sample (Lee *et al.* 2007). Cessation of self-harm (SH) (regardless of intent) has also been shown to reduce risk for later suicidal thoughts and behaviours (Koenig *et al.* 2017). Importantly however, these phenomena can be distinct, they do not always precede or co-occur with one another. For example, SA has been shown to occur in the absence of SI or suicide planning (Bertolote *et al.* 2005). It has been suggested by some therefore that self-injurious thoughts and behaviours may exist on a continuum of 'suicidality', anchored at one end by less severe experiences and the other by SA (Stanley *et al.* 1992; Sveticic & De Leo, 2012). In general, a skewed distribution, of related phenomena that decrease in frequency (SA occurs less frequently than SI) but increase in severity (SA behaviours are associated with more extreme outcomes than SI), has now been well established in a diverse range of samples (Scocco & De Leo, 2002; Bertolote *et al.* 2005; Nock *et al.* 2008; Ghazinour *et al.* 2010).

Little known research however has considered a suicide continuum that extends beyond these extreme thoughts and behaviours, to incorporate a much wider array of 'overlooked' phenomena that may vary in severity, but may constitute risk for SH at lower levels. We suggest that a wider, more inclusive range of threatening thoughts, and beliefs, referred to here as negative self-evaluation (NSE), can be meaningfully incorporated within the extant suicidality continuum framework. Evidence would suggest that NSE can manifest in various forms such as e.g. low self-esteem, feelings of inadequacy, self-criticism, shame, submissive behaviour, self-disgust and guilt (Brown *et al.* 2001; Gilbert *et al.* 2004; Gilbert *et al.* 2010; Gilbert, 2015). These self-reflective emotions and cognitions, which in turn underpin motivation and behaviour, are commonly reflected in people's self-evaluations, particularly regarding their e.g. sense of self-worth, value, ability, and belonging, as well as their beliefs about how they are perceived by others (Leary, 2007). More importantly, these NSE concepts are strongly related to one another (Cheung *et al.* 2004; Gilbert *et al.* 2004; Gilbert *et al.* 2010), and are commonly identified features of many suicide-related psychiatric phenomena e.g. depression, complex posttraumatic stress disorder (CPTSD), borderline personality disorder (BPD) and psychosis (Beck *et al.* 1979; Garety *et al.* 2001; Rüsch *et al.* 2007; American Psychiatric Association, 2013; Maercker *et al.* 2013; Zahn *et al.* 2015; World Health Organization, 2018). They have also been shown to characterise those at greater risk for SI (Goodwin & Marusic, 2003; Creemers *et al.* 2012; Byran *et al.* 2013), and

SH and SA **(**Fazaa & Page, 2003; Goodwin & Marusic, 2003; O'Connor, 2007; Gilbert *et al.* 2010; Forrester *et al.* 2017).

We propose therefore that, if modelled together, NSE indicators and established suicidality continuum indicators (SI, SH) will reveal an ordered, hierarchical, dimensional structure that more accurately and broadly captures the spectrum of suicide risk that exists in the general population. We also propose that this broader dimensional representation of risk will manifest at lower or higher levels for distinct groups within the population and that the 'level' of suicidality expressed by these groups will in turn reveal variation in the proposed underlying continuum. We propose too, that a range of established suicidality risk and outcome variables will meaningfully validate this extended continuum. It is our expectation that an NSE inclusive continuum will potentially afford greater and more valuable opportunities for clinicians to identify suicide risk and intervene at the earliest possible time. To the authors' knowledge, this is the first consideration and attempt to test an extended suicidality continuum and we believe that exploitation of existing population data coupled with sophisticated mixture modelling analysis affords a prudent framework to make an initial investigatory step.

Method

Sample

The second British Psychiatric Morbidity Survey (BPMS) was a large-scale epidemiological study conducted by the Office of National Statistics in 2000. The sample was designed to be representative of the adult population, aged 16-74, living in private households in Britain and its main aim was to estimate the prevalence and correlates of mental health problems. A multistage, stratified sampling design was adopted using the small user Postcode Address File (PAF), which yielded a total of 15,804 addresses. These addresses were visited by interviewers to identify households with at least one adult age 16-74 and one adult within each household was selected for interview using the Kish grid method.

Phase one assessment interviews were conducted which screened for the presence of mental disorders, risk factors, service use and sociodemographic variables. These interviews were successfully conducted with 8,580 adults (45% male, 55% female). Mean age was 45.37 (*SD* = 15.61) years. The majority of the sample were White (94%), with small proportions of Black (2%), Indian/Pakistani/Bangladeshi (2%) and other ethnic group respondents (2%). Details of the survey method are available (Singleton *et al.* 2001).

Measures

Negative self-evaluation

To examine whether a continuum of negative self-evaluation existed in the general population, a pool of NSE items was generated. The BPMS was screened for appropriate items and item selection was based on whether the item was considered to have a meaningful negative self-evaluative component which could not be solely attributed to context or situation. Appropriate items were located in the sections which screened for neurotic disorders (assessed using the Clinical Interview Schedule-Revised, CIS-R; Lewis *et al.* 1992), personality disorders (assessed using the self-completion version of the Structured Clinical

Interview for DSM-IV Axis 2, SCID-II; First *et al.* 1997) and deliberate self-harm. Only items which were available to the entire sample were utilised (i.e. screener linked items were not used).

In total, 14 items were identified on the basis of the criteria (see Table 1). One item was taken from the 'Depression' section of the questionnaire, four from the 'Deliberate Self-Harm' section and nine items were included from the 'Personality Disorder' section. All of these items were believed to reflect aspects such as negative self-concept, low self-esteem, subordination, worthlessness, SI and SH. All items were recoded as yes (1) or no (0). Responses of 'does not apply' relating to the personality disorder questions were recoded and treated as missing data.

Risk variables

A number of variables were used to both predict class membership and to evaluate class membership outcomes.

Sociodemographic: Age, sex (male, female), ethnicity (white, non-white), annual income (<£5,199; £5,200-£15,599; £15,600-£33,799; >£33,800), employment (employed, unemployed), area (semi-rural/rural, urban) and relationship status (couple, not in couple).

Substance use: Drink problem and drug dependence.

Adversities: Several adverse and traumatic events were included as risk variables. These were: experiencing serious illness, injury or assault, separation or divorce, being sacked or made redundant, looking for work unsuccessfully for more than one month, having a major financial crisis, having a problem with the police involving a court appearance, being bullied, experiencing violence at work, violence at home, sexual abuse, running away from home and being homeless.

Diagnostic variables: A selection of psychiatric diagnoses were used as risk and outcome variables. Presence of panic disorder, generalised anxiety disorder (GAD), obsessive compulsive disorder (OCD), specific phobia and social phobia were determined on the basis of CIS-R responses. Individuals who screened positive for psychosis in the initial interview were invited for a follow-up clinical interview to determine presence of a clinical psychotic disorder. The majority of these individuals took part in the follow-up interview and this information was used to generate a psychotic disorder diagnosis variable. Individuals who did not screen positive for psychosis in the initial interview were not believed to have a psychotic disorder. Details on the selection process for the follow-up interview are available (Singleton *et al.* 2001). These diagnostic variables were combined to form an 'Any Diagnosis' variable. Diagnoses of depression and mixed depression and anxiety (MAD) were not accounted for given that a screener for depression was used as one of the NSE items.

Suicide attempt: Lifetime suicide attempt was used as an outcome variable.

Analytic plan

Latent variable modelling was conducted in four main stages. First, as there is no existing theoretical framework describing NSE in the context of the suicidality continuum**,** exploratory factor analysis (EFA) was first employed to explore and identify the dimensional structure of NSE using the selected items. The full BPMS dataset was randomly split into two sub-samples, each containing approximately 50% of the survey respondents. The fit of six

models (a 1-factor through a 6-factor model) was assessed using EFA (oblique rotation) on one of the randomly generated subsamples. Second, confirmatory factor analysis (CFA) was used to test the validity of the best EFA generated model on the remaining subsample. A CFA model was then specified and estimated using the entire sample data to test whether the model held for the full sample. Third, after establishing the underlying dimensional structure of NSE using CFA, it was important to also test the best fitting model against a unidimensional (all items loading on one factor) and a second-order factor model (established factors loading onto a general higher-order factor), also using the full data to ensure that NSE was modelled as accurately as possible. Finally, Factor Mixture Modelling (FMM) was used to identify the fewest groups of individuals who shared the same profile of variation across the established dimensions of NSE. FMMA is a sophisticated hybrid modelling technique which combines latent class analysis with FA (Lubke & Muthén, 2007). In FMMA, individuals are grouped into classes and once classified, variation within the class is able to be modelled continuously (Clark *et al.* 2013). This can allow for better representation of the dimensionality of a psychological structure (Clark *et al.* 2013). Eight models were specified and tested. All models were specified and estimated using Mplus version 7.4 (Muthén & Muthén, 1998-2015) with the appropriate weighting variable. Weighted least squares means and variance adjusted (WLSMV) estimation was employed for the FAs and robust maximum likelihood estimation (Yuan & Bentler, 2000) was used for the FMMA. In order to avoid solutions based on local maxima, 100 random sets of starting values were initially used, with 10 final stage optimisations.

The goodness of fit of each model in the FAs was assessed using a series of fit statistics: the chi-square statistic, the comparative fit index (CFI; Bentler, 1990) the Tucker-Lewis index (TLI; Tucker & Lewis, 1973) and the root mean square error of approximation (RMSEA; Steiger, 1990). Based on recommendations for parameters of acceptable model fit (Hoyle & Panter, 1995; Hu & Bentler, 1999), a non-significant chi-square, values greater than 0.95 for the CFI and TLI and a value of less than 0.05 for the RMSEA indicated good model fit. Additionally, the standardized root mean square residual (SRMR; Joreskog & Sorbom, 1981) and the weighted root mean residual (WRMR) were estimated. It is recommended that the SRMR is close to or below 0.08 (Hu & Bentler, 1999) and for the WRMR, values closer to 1 indicate better fit (Yu, 2002). The relative fit of the FMMA models was compared by using three information theory-based fit statistics: the Akaike information criterion (AIC; Akaike, 1987), the Bayesian information criterion (BIC; Schwarz, 1978) and the sample size-adjusted Bayesian information criterion (ssa-BIC; Sclove, 1987). The model that produced the lowest values was judged to be the best fitting model. However, the BIC is considered to be the best of the fit indices tests in for deciding the number of classes in FMMA (Nylund *et al.* 2007). The Vuong-Lo-Mendell-Rubin likelihood ratio test (LRT; Lo *et al.* 2001) can also be used to determine class enumeration. When the LRT becomes non-significant it suggests the model with one less class is a better fit of the data. In addition to the fit statistics, it is important to take into consideration the theoretical and conceptual relevance of the factors and latent classes when interpreting the results.

A series of regression analyses was then conducted. First, a multinomial logistic regression analysis was carried out to assess whether the sociodemographic, substance use, adversities and diagnostic risk variables could discriminate between class memberships of the best-fitting FMM. Next, multivariate logistic regression analyses were used to investigate whether class membership predicted (i) individual diagnostic outcomes and (ii) SA history.

Results

The endorsement rates for these NSE items ranged from 42% (depression item) to 2% (NSSI item; see Table 1). All inter-item correlations were significant at the 0.01 level, ranging from 0.046 to 0.721; as correlations were below +/-.90 multicollinearity and singularity were not considered issues.

[Table 1 near here]

Preliminary factor analyses (EFA & CFA 50% of data)

Based on the results of the EFA (50% of the data), the 1-, 2- and 3-factor models were rejected. Both the 4- and 5-factor models were judged to have good fit, although the 5-factor model had a slightly better fit based on the fit index guidelines (Hu & Bentler, 1999). CFA was then performed on the remaining 50% of the data in an attempt to validate the results of the EFA and to compare the 4- and 5- factor models. The 'Hurt' item substantially cross-loaded in both models and was therefore removed before conducting the CFA. The 4-factor model was deemed to be marginally better than the 5-factor model in the CFA. Furthermore, the extremely high correlation between factors 4 and 5 (.95) in the 5-factor model was a cause for concern, suggesting that these two dimensions should not be separate.

Confirmatory factor analyses (100% of data)

The best fitting CFA model (4-factor model) was then specified and estimated using 100% of the data. This model was tested against (i) the 5-factor model (ii) a unidimensional (all items loading on one factor) and (iii) a second-order factor model (established factors loading onto a general higher-order factor). Table 2 outlines the factor loadings and fit indices for the competing CFA models on the full data.

[Table 2 near here]

Similar to the preliminary findings, the 4-factor model provided the best-fitting, most parsimonious representation of the full data. Both the factor loadings and the fit statistics indicated excellent model fit. Factor correlations ranged between 0.47 and 0.71. In this model, 3 items loaded onto Factor 1 (F1) which seemed to reflect a traditional depression dimension; 2 items loaded onto Factor 2 (F2) which reflected SH behaviour; 5 items loaded onto Factor 3 (F3) which was interpreted as low self-worth and feelings of subordination and the final factor (F4) contained 3 items relating to suicidal thoughts/SI.

Factor mixture modelling analyses

The fit indices for the FMMs are shown in the online supplementary material (Table 1-OS). They indicated that the AIC, BIC and ssaBIC continued to decrease from the 2-Class model through to the 8-Class model. The LRT however became non-significant in the 8-class model, suggesting that the model with one fewer class should be accepted. Therefore, the 7-class solution, which had an acceptable entropy value (.734) was accepted as the best fitting model (Figure 1).

[Figure 1 near here]

Class 1 was the smallest class (1.7%) and had elevated probabilities across all four dimensions and was the only class to be characterised by SH; Class 2 (6.7%) had elevated probabilities on the low self-worth, depression and SI factors (F3, F1 and F4); Class 3 (9.7%) was characterised by depressed mood and SI (F1 and F4); Class 4 (4.0%) reflected a group of people high on the low self-worth and depression dimensions (F3 and F1); Class 5 (13.9%)

was the second largest class characterised only by low self-worth (F3); Class 6 (8.7%) was characterised by elevated probabilities on the depression dimension only (F1); and finally, Class 7 was the largest class made up of over half of the sample which represented a baseline class which was not characterised by NSE. Across all classes that showed an elevated probability on the low self-worth dimension, this was more pronounced for the items relating to worrying about criticism and feeling inferior to others compared to the other items in this dimension.

Risk factors

Odds ratios (ORs) for the sociodemographic, substance use, adversity and diagnosis variables predicting FMM class membership are shown in the online supplementary material (see Table 2-OS). In general, there was a tendency for the more severe classes (1, 2 and 3) to have higher ORs, although there was variability throughout. Of the sociodemographic variables, younger age had some of the strongest ORs, especially for the more severe classes (1 and 2). The trend for the substance use variables was somewhat more difficult to interpret as the more severe classes did not always necessarily seem to reflect greater risk, however, the highest ORs were associated with Class 1. Again, there was variability with the trauma and adversity variables. The highest ORs were associated with Class 1 and bullying was the only trauma variable to be consistently related to all classes. Similarly, the diagnosis variable was also significantly associated with all classes, however most notably with Class 1.

Diagnostic and suicide attempt outcomes

Multivariate logistic regression was then conducted using a range of diagnoses as outcome variables (Table 3). Significant associations emerged between all classes and diagnoses, except Class 5 with panic disorder and psychosis and Class 4 with psychosis. Again, higher ORs were evident for the more severe classes. Particularly strong ORs (>100) were observed for social phobia and Classes 1, 2 and 4; OCD and Classes 1 and 2; and Psychosis and Class 1.

[Table 3 near here]

Compared to the baseline class, lifetime suicide attempt was associated with Classes 1, 2, 3 and 6. ORs were extremely elevated for Class 1 compared to the other classes. However, Classes 2 and 3, which were characterised in part by suicidal ideation also had elevated ORs (Table 4).

[Table 4 near here]

Discussion

The purpose of this study was to integrate concepts of NSE into the existing suicidality continuum and to use a series of robust analytic techniques to investigate the viability of this extended construct. A series of factor analyses indicated that a correlated 4-factor model, encapsulating feelings of low self-worth and subordination, depression, SI and SH constituted the best representation of the population data. Factor correlations in this model ranged from 0.47-0.71. The factors which were theorised to lie next to one another on the proposed continuum had the strongest relationships; the low self-worth factor correlated highly the depressive factor, as did the depression and SI factors, and the SI and SH factors. The results of the FMMA further supported an extended continuum framework, with 7 classes of graded

severity emerging from the data. Class composition suggested the presence of distinct groups that captured variation in 'internal threat' from less severe NSE experiences to the most severe suicidality related beliefs and behaviours. Furthermore, almost 45% of the sample were elevated on at least one NSE dimension, meaning that this was not just relevant to a small minority. Of note, only one class emerged which was characterised by SH; this class was the smallest but was also the Class with the highest endorsement probabilities across all NSE items.

A series of recent studies have highlighted the complex relationships between suicidal thoughts and behaviours. Zhang *et al.* (2017) investigated the pathways from negative emotion (e.g. depression and anxiety) to suicidal behaviours. They found negative emotion to be both directly linked to SI and indirectly through NSSI. Additionally, negative emotion was indirectly linked to a suicide attempt through both NSSI and SI. Similarly, NSSI has also been reported as a partial mediator between depression and suicidal risk, with depression also having a direct relationship to suicidal risk (Kang *et al.* 2018). These studies support a 'graduation' hypothesis from less to more severe experiences. Although the current study cannot infer temporal ordering, it similarly suggests that individuals in the classes characterised by experiences at the lower end of the continuum have the potential to transition or 'graduate' to increasingly severe experiences. Nevertheless, this is not a one-size-fits-all model. Not all individuals who die by suicide will have had this consecutive chain of experiences.

The findings reported here are preliminary and replication will be needed to further substantiate the model, however, the extended continuum that we have proposed does perform well against established criteria used to evidence the existence of continua in the population (see van Os *et al.* 2009 seminal systematic review and meta-analysis of the psychosis continuum). Consistent with van Os' criteria, our results suggest that an extended suicidality continuum demonstrates (i) psychopathological validity: similar patterns of comorbidity among classes; (ii) demographic and aetiological validity: shared demography and risk among classes, and (iii) distributional validity: a half-normal distribution was present. Epidemiological validity was also partially supported; this refers to the distribution of the construct relevant to the underlying theory. A logical assumption of an extended suicidality continuum would be that NSE features, at the lower end, would be more prevalent than NSSI, SI features at the higher end of the continuum; feelings of sadness/depressed mood, worry about criticism and rejection and feelings inferiority in the current analyses were endorsed most frequently (over 25% of respondents) while, as expected, the most extreme SH items were rarer (2-3%). However, notably, the SI items were endorsed more frequently than some of the low self-worth items. Importantly, beyond the use of the SA variable, predictive validity could not be inferred; further prospective research will be needed to understand class transitions over time.

Risk Factors

Although not consistent across all variables, there was a general trend for risk factors to be most strongly associated with the SH class (Class 1), followed by the two classes characterised by SI (Classes 2 & 3). This incremental effect was suggestive of a continuum of experiences. Furthermore, differences between the SH class and the other classes appeared to be quantitative rather than qualitative in nature. This is similar to Nock *et al.* (2008) who

found that sociodemographic and mental disorder risk factors varied in magnitude rather than type among suicide ideators, planners and attempters in their international study. Sexual abuse and bullying were particularly relevant to NSE class membership in the current study. Sexual abuse and bullying have both been found to be associated with SH and SI (Holt *et al.* 2015; Mossige *et al.* 2016) and it has been suggested that SH may be a maladaptive coping mechanism used to alleviate distress (Zlotnick *et al.* 1996; Klonsky, 2007). Less severe NSE experiences such as feelings of worthlessness are also influential in trauma-suicidal behaviour (Jeon *et al.* 2014). Moreover, consistent with the broader literature, interpersonal traumas (such as sexual abuse and bullying), compared to non-interpersonal traumas are more associated with BPD (Westphal *et al.* 2013) and CPTSD (Cloitre *et al.* 2013) which are both characterised by NSE and SH features.

Psychiatric Diagnoses and SA

Strong associations were observed between the NSE classes and the psychiatric diagnoses. Even classes characterised by the milder manifestations of internal threat only (e.g. Class 4) presented risk of a psychiatric disorder on par with some of the more severe classes (e.g. Class 2). These findings also support the literature showing that negative self-concepts are not specific to depression, BPD or CPTSD, where they are often central to diagnostic formulation. Rather, they are present across a spectrum of psychopathology and are seen in a range of mental health problems including eating disorders (Cooper & Turner, 2000; Stein & Corte, 2007), social anxiety (Clark, 2001) and psychosis (Bentall *et al.* 1994; Garety *et al.* 2001). NSE therefore is unlikely to be diagnostic specific but may instead be transdiagnostic, a relevant construct for psychopathology more generally.

SA acted, in part, as a validator for the proposed extended continuum as it represented the most extreme and severe outcome that could be considered for internal threat behaviour. Its association (or lack thereof), with each of the classes, indicated that while SA may be strongly associated with the most severe profiles of NSE, it is not likely to be an outcome for all who occupy positions on the proposed continuum. There seemed to be a notable risk that was specifically relevant for those who were/had actively engaged in SH behaviour. Those who entertained thoughts of suicide but who did not SH also exhibited significantly elevated risk of SA. Moreover, significant risk was also present for Class 6 (depression only); this was an interesting finding as Class 4 (low self-worth and depression) did not exhibit risk of SA.

Limitations

Despite the large general population sample and robust analytic methodology, some limitations must be acknowledged. First and foremost, the use of cross-sectional data did not afford opportunities to test the temporal and transitional assumptions that were proposed. This study was preliminary in nature, assessing whether the existence of such a continuum was conceivable; as aforementioned, future research using prospective data will be needed to demonstrate that individuals who occupy the lower end of the proposed continuum are also at risk of transitioning through the continuum. Moreover, the current models were tested on a single sample, and will require replication. Due to the constraints of working with secondary data, only NSE-related items which were available in the dataset were utilised. Therefore, incorporation of a broader selection of negative self-evaluative concepts, to more accurately model the extended continuum and understand its associated risks and outcomes over time, is also advised. The diagnoses of depression and MAD were not included as part of the

combined diagnosis variable or as individual diagnostic outcomes given that the NSE items contained a screener question for depression. This meant that these relationships could not be analysed. As previously stated, the suicidality continuum model does not align with every individuals' experiences and not all research corroborates this continuum hypothesis (e.g. De Leo *et al.* 2005; Dhingra *et al.* 2016). Likewise, we do not posit that the extended continuum is experienced universally.

Conclusion

Low self-worth and subordination, and depression, while representative of distinct groups in the population, are also highly prevalent in those who entertain suicidal thoughts and engage in SH behaviour. A suicidality continuum therefore may extend beyond the most extreme thoughts and behaviours and incorporate a much wider array of phenomena that may vary in severity, and may constitute a broader NSE spectrum. Challenging NSE therefore may be a fruitful avenue for therapeutic interventions that aim to reduce psychological distress, limit suicidal ideation, and prevent self-harming behaviour and death by suicide.

Declaration of Interest

None.

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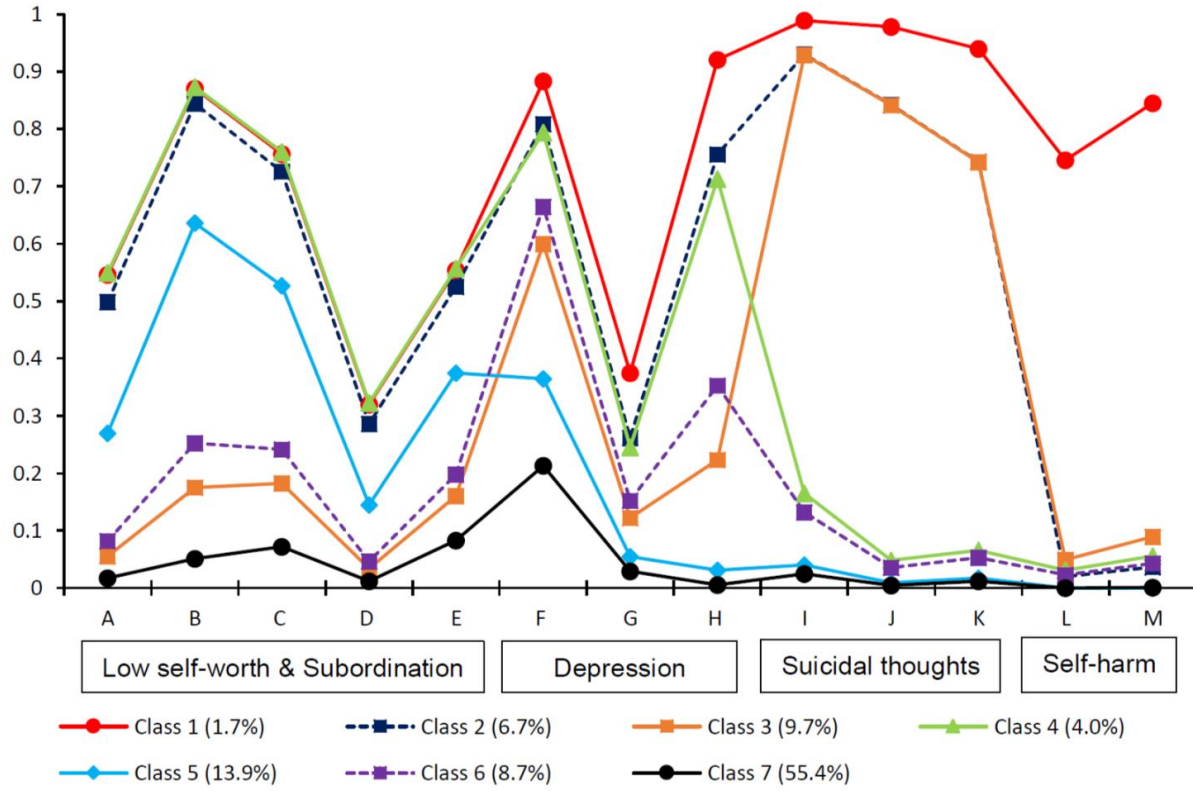

Figure 1. FMMA 7-class model profile plot displaying class response probabilities to NSE items

A Involvement; **B** Criticism; **C** Inferior; **D** Reassurance; **E** Disagree; **F** Depressed; **G** Uncomfortable; **H** Empty; **I** Not worth living; **J** Wish dead; **K** Suicidal ideation; **L** Non-suicidal self-injury; **M** Self-harm

Note: For a colour version, see this figure online.

Table 1. Frequency of negative self-evaluation items in the BPMS (*N* = 8,580)

Item	Label	*N* (%)
Have you had a spell of feeling sad, miserable or depressed in the past month?	Depressed	3581 (41.7)
Do you often worry about being criticised or rejected in social situations?	Criticism	2329 (27.1)
Do you believe that you're not as good, smart, or as attractive as most other people?	Inferior	2179 (25.4)
Have you ever felt that life was not worth living?	Not worth living	1911 (22.3)
Do you find it hard to disagree with people even when you think they are wrong?	Disagree	1754 (20.4)
Do you often feel empty inside?	Empty	1506 (17.6)
Have you ever wished that you were dead?	Wish dead	1465 (17.1)
Have you ever thought of taking your life, even if you would not really do it?	SI	1380 (16.1)
Do you avoid getting involved with people unless you are certain they will like you?	Involvement	1102 (12.8)
Do you usually feel uncomfortable when you are by yourself?	Uncomfortable	742 (8.6)
Have you tried to hurt or kill yourself or threatened to do so?	Hurt	685 (8.0)
Do you need a lot of advice or reassurance from others before you can make everyday decisions?	Reassurance	613 (7.1)
Have you ever cut, burned, or scratched yourself on purpose?	SH	271 (3.2)
Have you ever deliberately harmed yourself in any way but not with the intention of killing yourself?	NSSI	200 (2.3)

SI Suicidal ideation; *SH* Self-harm; *NSSI* Non-suicidal self-injury

Table 2. Factor loadings, factor correlations and fit indices for the unidimensional, 4-factor, 5-factor and second-order models in the CFA (N = 8,580)

Item	1-Factor	4-Factor				5-Factor					Second-Order			
	F1	F1	F2	F3	F4	F1	F2	F3	F4	F5	F1	F2	F3	F4
Depressed	.538	.628					.637				.633			
Uncomfortable	.454	.529								.565	.526			
Empty	.742	.919					.936				.916			
NSSI	.826		.958					.958				.962		
SH	.796		.934					.934				.930		
Involvement	.588			.748						.757			.748	
Criticism	.619			.812					.820				.813	
Inferior	.564			.726					.732				.726	
Reassurance	.495			.642						.648			.640	
Disagree	.398			.528						.531			.526	
Not worth living	.942				.960	.960								.960
Wished dead	.963				.974	.974								.975
SI	.907				.933	.933								.933
Second-order factor loadings											F1=.960; F2=.801 F3=.669; F4=.751			
Fit indices														
χ^2	3450.326		236.964					261.217				428.677		
Df	65		59					55				61		
P	0.000		0.000					0.000				0.000		
CFI	0.942		0.997					0.996				0.994		
TLI	0.930		0.996					0.995				0.992		
RMSEA	0.078		0.019					0.021				0.027		
WRMR	5.865		1.352					1.396				1.906		
4-Factor model correlations			F2	F3	F4									
		F1	0.62	0.71	0.71									
		F2		0.47	0.70									
		F3			0.47									

SI Suicidal ideation; *SH* Self-harm; *NSSI* Non-suicidal self-injury; χ^2 Likelihood ratio chi-square; *CFI* Comparative fit index; *TLI* Tucker Lewis Index; *RMSEA* Root mean standard error of approximation; *WRMR* Weighted root mean square residual.
Note: all factor loadings and factor correlations are statistically significant ($p < 0.001$)

Table 3. Multivariate logistic regression with diagnoses as outcomes (N = 8,580)

	OR (95% CI)					
Class	Panic disorder	GAD	OCD	Psychosis	Specific phobia	Social phobia
1	9.10 (2.64-31.41)***	28.00 (17.09-45.89)***	107.62 (35.24-328.66)***	121.35 (22.84-644.76)***	67.04 (25.32-177.48)***	573.01 (127.15-2582.32)***
2	11.53 (4.91-27.07)***	24.45 (17.04-35.08)***	115.29 (42.97-309.37)***	31.86 (5.66-179.47)***	32.98 (13.84-78.63)***	217.97 (50.82-934.97)***
3	7.05 (2.82-17.63)***	8.02 (5.41-11.87)***	24.36 (8.07-73.55)***	25.98 (5.15-131.15)***	10.39 (3.88-27.82)***	28.82 (5.34-155.45)***
4	11.28 (4.22-30.17)***	14.08 (9.17-21.62)***	45.13 (14.86-137.09)***	8.69 (0.75-100.41)	22.71 (8.33-61.94)***	111.78 (24.31-514.04)***
5	2.50 (0.94-6.63)	3.07 (1.97-4.78)***	3.89 (1.04-14.49)*	2.59 (0.22-29.87)	5.30 (1.86-15.13)**	9.72 (1.34-70.46)*
6	6.14 (2.42-15.59)***	7.92 (5.31-11.81)***	24.27 (8.15-72.27)***	9.20 (1.23-69.06)*	4.10 (1.23-13.72)*	26.57 (4.73-149.40)***

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4. Multivariate logistic regression with suicide attempt as outcome (N = 8,580)

Class	OR (95% CI)
1	2743.87 (968.94-7770.15)***
2	346.51 (127.49-941.75)***
3	326.95 (120.97-883.67)***
4	3.50 (0.39-31.42)
5	2.99 (0.67-13.39)
6	16.15 (5.05-51.64)***

*** $p < .001$

Online Supplement (OS): Table 1-OS Fit indices for factor mixture models (FMMs) (*N* = 8,580)

Model	Log-likelihood	Par.	AIC	BIC	ssaBIC	LRT (*p*)	Entropy
2	-39160.802	27	78375.603	78566.147	78480.346	-45144.722 (0.0000)	.895
3	-37930.012	32	75924.023	76149.853	76048.163	-39160.802 (0.0000)	.798
4	-37269.243	37	74612.486	74873.602	74756.022	-37930.012 (0.0000)	.813
5	-37138.709	42	74361.148	74657.820	74524.351	-37269.243 (0.0000)	.827
6	-37030.889	47	74155.777	74487.465	74338.108	-37154.287 (0.0000)	.790
7	-36926.200	52	73956.400	74323.374	74158.127	-37030.889 (0.0001)	.734
8	-36846.718	57	73807.436	74209.696	74028.560	-36926.200 (0.5031)	.746

Par., Number of free parameters; AIC, Akaike information criterion; BIC, Bayesian information criterion; ssaBIC, Sample size adjusted BIC; LRT, Vuong-Lo-Mendell-Rubin likelihood ratio test

OS: Table 2-OS Predictors of NSE class membership (Class 7 reference class (baseline NSE)) (N = 8,580)

	OR (95% CI)					
Predictors	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**
Sociodemographic						
Female	2.60 (1.62-4.16)***	2.44 (1.91-3.11)***	2.39 (1.96-2.92)***	1.96 (1.48-2.60)***	1.77 (1.51-2.08)***	1.34 (1.11-1.63)**
Age[a] <24	15.88 (5.09-49.57)***	3.50 (2.10-5.83)***	1.00 (0.65-1.55)	2.57 (1.52-4.36)***	1.50 (1.09-2.05)*	0.95 (0.65-1.39)
25-34	10.54 (3.53-31.43)***	3.74 (2.39-5.87)***	1.45 (1.03-2.04)*	1.42 (0.86-2.34)	1.38 (1.06-1.80)*	1.07 (0.78-1.47)
35-44	5.27 (1.72-16.15)**	3.97 (2.54-6.21)***	1.78 (1.28-2.48)***	1.99 (1.23-3.22)**	1.52 (1.17-1.97)**	1.11 (0.81-1.52)
45-54	2.35 (0.72-7.67)	3.00 (1.90-4.73)***	1.93 (1.39-2.69)***	1.67 (1.02-2.74)*	1.36 (1.04-1.78)*	1.05 (0.76-1.45)
55-64	0.80 (0.19-3.32)	2.49 (1.59-3.88)***	1.51 (1.10-2.08)*	1.57 (0.98-2.51)	0.91 (0.70-1.18)	1.10 (0.82-1.47)
Non-white ethnicity	0.31 (0.11-0.84)*	0.57 (0.35-0.92)*	1.07 (0.76-1.52)	1.59 (1.04-2.43)*	1.09 (0.82-1.45)	1.24 (0.88-1.74)
Income[b] <£5,199	1.87 (0.52-6.73)	3.05 (1.63-5.71)***	0.98 (0.66-1.45)	2.47 (1.21-5.02)*	2.30 (1.62-3.27)***	2.16 (1.37-3.40)***
£5,200-£15,599	2.04 (0.60-6.96)	2.50 (1.37-4.57)**	1.14 (0.80-1.63)	2.14 (1.09-4.22)*	1.82 (1.31-2.53)***	1.89 (1.24-2.88)**
£15,600-£33,799	0.65 (0.17-2.52)	1.63 (0.88-3.02)	1.02 (0.71-1.47)	1.42 (0.71-2.86)	1.52 (1.09-2.12)*	1.53 (1.00-2.35)
Unemployed	1.89 (1.19-3.00)**	1.28 (1.00-1.64)	1.28 (1.03-1.60)*	1.26 (0.93-1.69)	0.85 (0.71-1.03)	1.03 (0.82-1.29)
Rural area	1.04 (0.67-1.59)	1.11 (0.90-1.36)	1.02 (0.86-1.22)	1.05 (0.82-1.35)	0.99 (0.86-1.14)	0.96 (0.81-1.15)
Not in a couple	1.61 (1.06-2.45)*	1.79 (1.45-2.22)***	1.63 (1.36-1.94)***	1.38 (1.06-1.78)*	0.97 (0.83-1.13)	1.71 (1.43-2.04)***
Substance use						
Drink problem	1.78 (1.18-2.69)**	1.08 (0.85-1.37)	1.29 (1.06-1.57)*	1.55 (1.18-2.03)**	1.04 (0.88-1.23)	1.16 (0.95-1.42)
Drug dependence	3.11 (1.71-5.65)***	1.60 (0.97-2.63)	2.34 (1.54-3.57)***	1.47 (0.80-2.68)	0.82 (0.48-1.40)	2.13 (1.36-3.33)***
Adversities						
Illness, injury or assault	2.73 (1.81-4.11)**	1.52 (1.23-1.89)***	1.49 (1.24-1.78)***	1.04 (0.79-1.37)	1.07 (0.91-1.26)	1.23 (1.02-1.48)*
Divorce or separation	1.58 (1.04-2.42)*	1.36 (1.10-1.70)**	1.75 (1.47-2.10)***	1.19 (0.91-1.55)	0.99 (0.84-1.16)	1.37 (1.14-1.65)***
Sacked or made redundant	1.31 (0.84-2.03)	1.20 (0.95-1.51)	1.27 (1.05-1.53)*	0.90 (0.68-1.20)	1.09 (0.92-1.28)	0.88 (0.72-1.08)
Out of work >1 month	2.12 (1.38-3.25)***	1.25 (0.98-1.59)	1.41 (1.15-1.73)***	1.26 (0.94-1.69)	1.15 (0.96-1.38)	1.03 (0.83-1.28)
Major financial crisis	1.37 (0.84-2.25)	1.86 (1.42-2.44)***	1.56 (1.23-1.96)***	1.27 (0.89-1.82)	0.96 (0.76-1.23)	1.28 (0.98-1.67)
Problems with the law	1.09 (0.64-1.85)	1.16 (0.83-1.61)	1.15 (0.87-1.51)	1.00 (0.65-1.54)	0.99 (0.75-1.31)	0.93 (0.68-1.28)
Bullying	2.54 (1.68-3.84)***	2.23 (1.76-2.82)***	2.37 (1.94-2.90)***	2.33 (1.75-3.09)***	1.54 (1.28-1.86)***	1.71 (1.37-2.13)***
Violence at work	0.61 (0.27-1.40)	0.85 (0.53-1.37)	1.08 (0.74-1.57)	0.93 (0.52-1.66)	0.71 (0.47-1.08)	1.16 (0.77-1.74)
Violence at home	1.57 (0.97-2.54)	1.80 (1.33-2.43)***	1.39 (1.05-1.83)*	1.95 (1.33-2.84)***	0.99 (0.72-1.36)	1.21 (0.87-1.68)
Sexual abuse	5.39 (3.06-9.50)***	4.28 (2.86-6.41)***	2.93 (1.98-4.34)***	1.64 (0.91-2.94)	1.58 (1.00-2.50)*	1.61 (0.97-2.67)
Runaway from home	3.27 (2.00-5.32)**	1.94 (1.35-2.79)***	1.82 (1.30-2.54)***	1.27 (0.78-2.07)	1.10 (0.75-1.61)	1.24 (0.82-1.88)
Homeless	2.16 (1.23-3.79)**	1.52 (1.02-2.29)*	1.80 (1.26-2.58)***	1.56 (0.93-2.63)	0.97 (0.61-1.53)	0.91 (0.56-1.48)
Psychiatric Diagnoses						
Any disorder[c]	26.27 (16.44-41.99)***	13.72 (9.99-18.84)***	4.54 (3.25-6.34)***	13.55 (9.48-19.37)***	2.65 (1.84-3.80)***	6.48 (4.66-9.03)***

Note. * p < .05, ** p < .01, *** p < .001. Reference categories: [a] >65, [b] >£33,800. [c] Any disorder variable includes panic disorder, GAD, OCD, specific phobia, social phobia or psychosis.